

Claims

1. Apparatus for adjusting a position between a multi-layered printed circuit board that includes a plurality of insulated layers and a plurality of conductive layers having a conductive pattern and an object in a producing process of the multi-layers printed circuit board, comprising

5 a mark that can be imaged by Xrays formed on at least one of said layers of said multi-layered printed circuit board,

means for irradiating Xrays on an area containing said mark,

10 a projection screen that can convert Xrays to one of visible rays, ultra violet rays or infrared rays for projecting said mark irradiated by Xrays thereon,

15 means for moving at least one of said multi-layered printed circuit board and said object based on said mark projected on said projection screen so as to adjust the relative position therebetween.

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2. Apparatus of claim 1 further comprising:

an adjusting mark formed on said object, wherein

20 said means for moving moves at least one of said multi-layered printed circuit board and said object based on said board mark projected on said projection screen and said adjusting mark so as to adjust the relative position between said board and said object.

3. Apparatus of claim 1 wherein:

said projection screen is a fluorescent screen.

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4. Apparatus of claim 1 wherein:

25 said mark that can be imaged by Xrays is formed on a core board of the multi-layered printed circuit board.

30 5. Apparatus of claim 1 wherein:

said means for irradiating X-rays comprises an X-ray irradiatoin device, and wherein the position of said Xray irradiation device is corrected before said positioning.

5 6. Apparatus of claim 5 wherein:

 said object is provided with a mark for positioning,

 said projection screen is movable,

 said board and said object are relatively positioned so as to place said mark formed on at least one of said layers of said multi-layered printed circuit

10 board and said mark for positioning in a predetermined positioning relation under a visible condition after moving said projection screen to a refuge position,

 said Xray irradiation device is movable so as to place the projection shape of said mark formed on at least one of said layers on the projection 15 screen that is movable back to a previous position and the mark for positioning in the predetermined positioning relation before said adjusting the relative position between the board and the object.

7. Apparatus of claim 5 wherein:

20 said object is provided with visible first and second marks,

 the core board is provided with a visible second board mark,

 the relative position of said core board and said object are adjusted so as to place said second mark and said second board mark in the predetermined positioning relation under a visible condition,

25 said Xray irradiation device is moved so as to place the projection shape of the board mark on the projection screen and the first mark in the predetermined positioning relation before said adjusting the relative position between the board and the object.

30 8. Apparatus of claim 5 wherein:

the gap between the board and the object is increased when positioning the Xray irradiation device.

9. Apparatus for producing a multi-layered printed circuit board that includes

- 5 a plurality of insulated layers and a plurality of conductive layers having a conductive pattern, comprising:

a photo mask facing one side of a board on which multi-layered printed circuits will be formed, the photo mask having a pattern for a conductive circuit to be formed on the board,

- 10 a board mark that can be imaged by Xrays formed on at least one of said layers of said multi-layered printed circuit board,

a mask mark formed on said photo mask,

means for irradiating Xrays on an area containing said board mark,

- 15 a projection screen that can convert Xrays to one of visible rays, ultra violet rays or infrared rays for projecting said mark thereon irradiated by Xrays,

means for moving at least one of said multi-layered printed circuit board and said photo mask based on said board mark projected on said projection screen and said mask mark so as to adjust the relative position between said

- 20 board and said photo mask,

a projection light source shining said pattern of said photo mask onto said board.

10. Apparatus of claim 9, further comprising:

- 25 an image recognition means for recognizing said mask mark of the photo mask and said board mark projected on the projection screen,

wherein said means for moving moves at least one of said board and said photo mask so as to make said mask mark and said board mark positioned in a certain relation.

11. Apparatus of claim 9, wherein:

 said means for irradiating Xrays is located at the side of said board other than the side facing the photo mask,

 said projection screen is set between said board and said photo mask and

5 movable from between them.

12. Apparatus of claim 9, wherein:

 said projection screen is mounted on said photo mask.

10 13. Apparatus of claim 9 further comprising:

 a projecting lens for projecting said pattern of said photo mask, wherein
 said projection light source projects said pattern of said photo mask via
 said projecting lens onto said board.

15 14. Apparatus of claim 9 wherein:

 said projection screen is a fluorescent screen.

15. Apparatus for boring a hole through multi-layers of a printed circuit board
that includes a plurality of insulated layers and a plurality of conductive
20 layers having a conductive pattern used in a producing process of a
multi-layered printed circuit board, comprising

 a mark that can be imaged by Xrays formed on at least one of said layers
of said multi-layered printed circuit board,

 means for irradiating Xrays on an area containing said mark,

25 a projection screen that can convert Xrays to one of visible rays, ultra
violet rays or infrared rays for projecting said mark irradiated by Xrays
thereon,

 means for moving at least one of said multi-layered printed circuit board
and a laser projection point of the apparatus for boring based on said mark
30 projected on said projection screen so as to set up said laser projection point.

16. Apparatus for boring a hole through laminated printed circuit boards that compiles a plurality of circuit boards used in a producing process of said laminated printed circuit boards, comprising

- 5 a mark that can be imaged by Xrays formed on at least one of said boards,
means for irradiating Xrays on an area containing said mark,
a projection screen that can convert Xrays to one of visible rays, ultra violet rays or infrared rays for projecting said mark irradiated by Xrays thereon,
- 10 means for moving at least one of said boards and a boring point of the apparatus for boring based on said mark projected on said projection screen so as to set up said boring point.

17. A method for adjusting a position of a multi-layered printed circuit board that includes a plurality of insulated layers and a plurality of conductive layers having a conductive pattern in a producing process of the multi-layered printed circuit board comprising the steps of:

- 15 forming a mark that can be imaged by Xrays on at least one of said layers of said multi-layered printed circuit board,
- 20 irradiating Xrays on an area containing said mark and projecting said mark on a projection screen that can convert Xrays to one of visible rays, ultra violet rays or infrared rays,
detecting a position of said multi-layered printed circuit board based on said mark projected and adjusting the position against an object.

- 25 18. The method of claim 17; wherein
said producing process of the multi-layered printed circuit board comprises the steps of:
 - forming a conductive pattern by an aligner,
 - 30 forming a mark for position adjustment on a photo mask of the aligner,

said adjustment includes the step of:

adjusting the position of said multi-layered printed circuit board and said photo mask by said mark for position adjustment and said mark projected on said projection screen.

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19. The method of claim 17; wherein

said producing process of the multi-layered printed circuit board comprises the steps of:

forming a via hole between layers of said multi-layered printed circuit
10 board by using a laser processor;

said adjustment includes the step of:

adjusting the position of said multi-layered printed circuit board and said
laser processor based on said mark projected on said projection screen.

15 20. The method of claim 17 wherein:

said projection screen is a fluorescent screen.